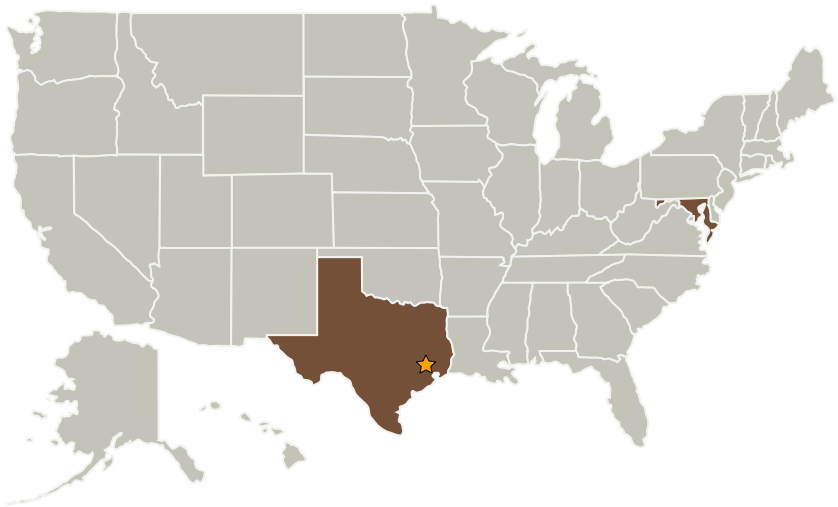
Automated, Real-Time Targeting and Guidance Software for Lunar Descent and Precision Landing, Phase I

Completed Technology Project (2009 - 2009)

Project Introduction

he objective of this proposal is to research, design and develop an automated real-time targeting and guidance (ARTGUID) software for precision lunar landing and descent. The software tool will be reliable, extensible, scalable and verifiable based on the complex mission-driven requirements on the Altair Lunar Lander and other landers for NASA's future exploration missions. It will provide an integrated real-time targeting, guidance, navigation and control (TGNC) capability to perform autonomous vehicle-centered operations to accomplish mission objectives. The algorithms provide a fuel-optimal powered descent and precision landing at any desirable site on the Moon. The method of technical approach is based on the revalidation, operational assessment and qualitative improvement of all Apollo-era programs. The real-time targeting and guidance operations are performed on all phases of the descent trajectory by employing exact closed-form solutions for constant thrust arcs on braking phase. Development of the real-time TGNC capability represents an innovative approach in advancing the state-of-the-art autonomous landing GNC technology. The preliminary development of the advanced targeting algorithms has demonstrated the reliability, functionality and likelihood of success of the proposed software by re-constructing the Apollo 11 and 12 post-flight lunar-descent trajectories and guidance performances.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Emergent Space Technologies, Inc.	Supporting Organization	Industry	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - TX17.1 Guidance and Targeting Algorithms
    - TX17.1.2 Targeting Algorithms